

U.S. DEPARTMENT OF TRANSPORTATION  FEDERAL AVIATION ADMINISTRATION  TYPE CERTIFICATE DATA SHEET E20EA	TCDS NUMBER E20EA REVISION: 14		
	DATE: February 10, 2000		
	PRATT & WHITNEY		
	MODELS: JT9D-3A                      JT9D-7A                      JT9D-20 JT9D-7                      JT9D-7AH                      JT9D-7J JT9D-7H                      JT9D-7F                      JT9D-20J		

Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E20EA) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER: Pratt & Whitney  
United Technologies Corporation  
Commercial Products Division  
East Hartford, Connecticut 06108

I. MODELS	JT9D-3A	JT9D-7, -7H	JT9D-7A, -7AH	JT9D-7F
TYPE	Turbofan, dual axial 15 stage compressor, annular combustion chambers, and 6 stage turbine.			
RATINGS (See NOTE 5)				
Maximum Continuous at sea level, static thrust, lb	36,400	39,650	40,080	40,200
Takeoff static thrust at sea level, lb (See NOTES 14 & 15)				
Dry (5 minutes)	43,500	45,500	46,150	46,750
With water injection	45,000	47,000	47,670	48,650
COMPONENTS				
Fuel Control (See NOTE 7)	Hamilton Std. JFC68-3	- -	- -	- -
Fuel Pump	Thompson Ramo Wooldridge Inc. 373400	- -	- -	389400
Low compressor bleed Actuator	PW P/N 647977 Hamilton Std.	- -	- -	- -
High compressor stator vane Control	EVC3-2	- -	- -	- -
Start bleed control/ 3.0 bleed control	PW P/N 694927/ 694926	711483/ 711484	- -	- -
FUEL	See NOTE 11	- -	- -	- -
OIL	See NOTE 12	- -	- -	- -

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LEGEND: "- -" INDICATES "SAME AS PRECEDING MODEL"

"---" NOT APPLICABLE

NOTE: ALL PAGES ARE REFORMATTED. SIGNIFICANT CHANGES IF ANY, ARE BLACK-LINED IN THE LEFT MARGIN.

I. MODELS (Continued)	JT9D-7J	JT9D-20	JT9D-20J	
TYPE	Turbofan, dual axial 15 stage compressor, annular combustion chambers, and 6 stage turbine.			
RATINGS (See NOTE 5)				
Maximum Continuous at sea level, static thrust, lb	40,200	39,240	39,240*	
Takeoff static thrust at sea level, lb (See NOTES 14 & 15)				
Dry (5 minutes)	48,650	44,500*	48,050*	
With water injection	---	47,500	---	
COMPONENTS				
Fuel Control (See NOTE 7)	Hamilton Std. JFC68-3	JFC68-4	- -	
Fuel Pump	Thompson Ramo Wooldridge Inc. 373400	373400	389400	
Low compressor bleed Actuator	PW P/N 674977 Hamilton Std.	- -	- -	
High compressor stator vane Control	EVC3-2	EVC3-4	- -	
Start bleed control/ 3.0 bleed control	PW P/N 694927/ 694926	719306/ 719306	- -	
FUEL	See NOTE 11	- -	- -	
OIL	See NOTE 12	- -	- -	
*As installed in a DC-10-40 nacelle				

I. MODELS	JT9D-3A	JT9D-7, -7H	JT9D-7A, -7AH, -7F, -7J	JT9D-20	JT9D-20J
PRINCIPAL DIMENSIONS					
Maximum length, in. (including spinner)	154.89	- -	- -	- -	- -
Width, in.	95.60	- -	- -	96.61	- -
WEIGHT (Dry), lb	8713	8880	- -	8470	8580
(Includes basic engine with all essential accessories; with fuel heater, oil tank and fuel oil cooler; but excluding starter, exhaust nozzle, and power source for the ignition system). Standard equipment included in engine dry weight. (SEE NOTE 17)					
CENTER OF GRAVITY, in.					
Forward of K-flange ( $\pm 1.0$ )	2.1	2.1	- -	3.7	3.5
Below engine center line ( $\pm 0.5$ )	1.0	1.2	- -	2.8	2.8
IGNITION					
Exciters	Two GLA P/N 43572, 43925	- -	- -	Champion AA72S-A, AA134S-1, AA143S-2	- -
Igniters	Champion AA72S-A, AA117S, AA134S, AA134S-1, AA143S-2	- -	- -		

## CERTIFICATION BASIS

FAR 33 effective February 1, 1965, as amended by 33-1, 33-2, and 33-3 and Special Condition No. 33-8-EA-3.

Type Certificate No. E20EA issued May 13, 1969; and subsequent revisions Model JT9D-3A added January 9, 1970; Model JT9D-7 added June 14, 1971; Model JT9D-7A added September 22, 1972; Model JT9D-20 added October 16, 1972; Models JT9D-7H and -7AH added June 19, 1974; Model JT9D-7F added September 30, 1974; Model JT9D-7J added August 31, 1976; Model JT9D-20J added December 29, 1986.

Dates of Applications for Type Certificate: May 10, 1968; November 19, 1969 (JT9D-3A); September 9, 1970 (JT9D-7); July 28, 1972 (JT9D-7A); August 31, 1982 (JT9D-20); April 26, 1974 (JT9D-7H, -7AH); February 4, 1974 (JT9D-7F); October 29, 1974 (JT9D-7J); and April 22, 1986 (JT9D-20J).

## PRODUCTION BASIS

Production Certificate Number 2

## NOTES

NOTE 1. Maximum permissible engine operating speeds for the engine rotors are as follows:

	<u>JT9D-3A</u>	<u>JT9D-7, -7A, -7F, -7J, -20J</u>	<u>JT9D-7H, -7AH, -20</u>
Low pressure rotor (N1), rpm	3650	3750	3650
High pressure rotor (N2), rpm	7850	8000	8000

NOTE 2. Maximum permissible temperatures are as follows:

Turbine gas temperature (Tt6)

	<u>JT9D-3A</u>	<u>JT9D-7, -7H, -7A, -7AH</u>	<u>JT9D-7F</u>
Takeoff (5 min.)	(846°C) 1555°F	(915°C) 1679°F	(950°C) 1742°F
Maximum continuous	(816°C) 1500°F	(880°C) 1616°F	(910°C) 1670°F
Maximum acceleration	(846°C) 1555°F	(915°C) 1679°F	(950°C) 1742°F
Starting	(650°C) 1202°F	(650°C) 1202°F	(650°C) 1202°F
	<u>JT9D-7J</u>	<u>JT9D-20</u>	<u>JT9D-20J</u>
Takeoff (5 min.)	(985°C) 1805°F	(915°C) 1679°F	(985°C) 1805°F
Maximum continuous	(925°C) 1697°F	(875°C) 1607°F	(925°C) 1679°F
Maximum acceleration	(985°C) 1805°F	(915°C) 1679°F	(985°C) 1805°F
Starting	(650°C) 1202°F	(650°C) 1202°F	(650°C) 1202°F

	<u>JT9D-3A</u>	<u>JT9D-7, -7H, -7A, -7AH</u>	<u>JT9D-7F, -7J</u>	<u>JT9D-20, -20J</u>
Oil Inlet (135°C) 275°F (continuous operation)	--	--	--	--
(162°C) 325°F (transient operation)*	--	--	--	--

\*Transient operation above 135°C, (275°F) is limited to 20 minutes.

Pratt & Whitney Service Bulletin JT9D 6352 is available to increase JT9D-7A series EGT margin by 20°C. This is accomplished by reducing indicated EGT by 20°C using a shunt device. Service Bulletin 6352 also defines required hardware changes, which must be accomplished prior to installation of the shunt. Operating procedures and maintenance requirements shall be conducted per indicated EGT.

External engine component maximum temperature (limiting temperature of specific components is as specified in the engine installation and operating manual.)

NOTE 3. Fuel and oil pressure limits are as follows:

Fuel pressure: At inlet to engine system pump, not less than 5 psi above the true vapor pressure of the fuel and not greater than 70 psig with a vapor/liquid ratio of zero.

Oil pressure: 40 to 60 psig

NOTE 4. Maximum permissible air bleed extraction is as follows:

	JT9D-3A/7/7H/7A 7AH/7F/7J		JT9D-20/20J	
	Percent of Primary Engine Airflow		Percent of Primary Engine Airflow	
	<u>Normal Bleed</u>	<u>Maximum Bleed</u>	<u>Normal Bleed</u>	<u>Maximum Bleed</u>
High compressor bleed				
a. Idle to 40% max. cont.	10%	13%	10%	13%
b. 40% max. cont. to takeoff *	5%	5%	5%	6.5%

\*5% is the maximum allowable from the 8th stage in this thrust range. The 6.5% listed in allowable is from the 15th stage alone or from a combination of 8th and 15th stage bleeds.

NOTE 5. These installation ratings are based on static test stand operation under the following conditions:

Compressor inlet air at 59°F and 29.92 in. hg.  
 Jet nozzle exhaust pipe per PW Drawing P/N 676701 (-3A); 636901 (-7, -7A, -7AH, -7F, -7J); 654001 (-20, -20J).  
 Fan exit nozzle per PW Drawing P/N 676701 (-3A); 636901 (-7, -7A, -7AH, -7F, -7J); 654001 (-20, -20J).  
 PW bellmouth engine inlet.  
 No aircraft accessory loads or air extraction.  
 No anti-icing airflow.  
 Turbine gas temperature limits and engine rotor speed limits not exceeded.  
 For sea level static ideal thrust of -7F and -7J models, see NOTE 15.

NOTE 6. The following accessory drive provisions are incorporated:

JT9D-3A, -7, -7H, -7A, -7AH, -7F, -7J					
		Speed Ratio			
DRIVE		to	Torque (in-lb)		Overhang
<u>HIGH ROTOR</u>	<u>Rotation</u>	<u>Turbine Shaft</u>	<u>Continuous Static</u>		<u>(in-lb)</u>
Starter	CC	1.091:1	---	*	500
C.S.C. Generator**	CC	1.091:1	***	15,960	1,575
Fluid Power Pump	CC	.500:1	1890	9,450	400
Fluid Power Pump	CC	.499:1	1890	9,450	400
Tachometer	C	.538:1	7	50	---

C - Clockwise; CC - Counterclockwise

\* Maximum Starter torque 750 ft-lb, shear section will fail at 1400 to 1610 ft-lb.

\*\* Generator driven by co-axial shaft from constant speed drive.

\*\*\* Maximum allowable continuous torque values are equivalent to 210 hp at any engine speed at or above sea level ground idle.

NOTE 7. Fuel controls for model designations:

<u>Model</u>	<u>HSD Fuel Control P/N</u>	<u>PW P/N</u>	<u>Description</u>
JT9D-3A	734500-3	711622	Wet Control
	734499-4	711623	Dry Control
JT9D-7/7A/7AH	748000-5	770019	Wet Control - Accel cam Different from D-3A
	747999-5	770020	Dry Control
JT9D-7F	759100-1	750832	Wet Control - Accel cam Different from D-3A or D-7J engines
	759000-1	750818	Dry Control
JT9D-7J	759000-1	750818	Dry Control - same cam as D-7F
JT9D-20/20J	743699-3	747544	Wet Control - D-20 only
	743555-3	747543	Dry control

NOTE 8. Power setting, power checks and control of engine output in all operations are to be based upon PW engine charts referring to turbine discharge section gas pressures. Pressure probes are included in the engine assembly for this purpose.

NOTE 9. Whenever engine anti-ice is used to maintain at least 50 percent N1 RPM above 10,000 feet, and at least 45 percent N1 rpm below 10,000 feet.

NOTE 10. These engine models meet Item 1 in Special Condition No. 33-8-EA-3 in the uncowed configuration.

NOTE 11. Fuels meeting the requirements of the latest applicable issue of FAA approved PW Turbojet Engine Service Bulletin No. 2016, which includes with other fuel information requirements of PW Specification No. 522, are acceptable for these engines. Approved fuel additives and allowable concentrations for each are also included in Service Bulletin No. 2016.

NOTE 12. The following oils are eligible for these engines:

Synthetic type conforming to PW Specification No. 521 as revised. Approved brand oils listed in PW Turbojet Engine Service Bulletin No. 238.

NOTE 13. Certain engine parts are life limited. These limits are listed in the FAA Approved Pratt & Whitney JT9D Series Turbofan Overhaul Manual Part No. 646028 (-3A, -7, -7H, -7A, -7AH, -7F, -7J, -20, -20J) Time Limits Section. These limits are also listed in the FAA Approved Pratt & Whitney JT9D Turbofan Overhaul Manuals Part Number 770407 (-3A, -7) and Part Number 770408 (-7) Time Limits Section.

NOTE 14. For water injection, the following water flow rate is utilized:

	<u>JT9D-3A</u>	<u>JT9D-7, -7H, -7A, -7AH, -7F, -20</u>
Constant water flow - lb/hr	20,000 -23,000	26,000 - 30,000
Feed pressure - psia	507 -700	534 - 750

Water alone is specified and should contain no more than 10 (ppm) parts per million impurities. Use of water is limited to takeoff operation up to an altitude of 8,000 feet for D-3A, and 10,000 feet for D-7, -7H, -7A, -7AH, -7F and -20, at the minimum ambient temperatures of 32°F. Takeoff using both water injection and dry takeoff power is limited to a maximum period of 5 minutes including operation with water injection for not more than 2 1/2 minutes (JT9D-3A, -7, -7H, -7A, -7AH, -7F) and 5 minutes (JT9D-20).

NOTE 15. The following models incorporate the following general characteristics:

<u>JT9D Model</u>	<u>Characteristics</u>
-3A	Same as -3 except for dry takeoff rating extended to 80°F ambient temperature sea level static with thrust frame and other improved engine parts. With water injection (equipment an additional 40 lb) takeoff rating of 45,000 lb is available to 80°F ambient temperature sea level static. The JT9D-3 engine model was deleted on December 29, 1986, since it is no longer in service and the manufacturer has no plans to produce any more engines of that model.
-7	Same as -3A except for dry takeoff rating extended to 80°F ambient temperature sea level static with thrust frame wet takeoff rating of 47,000 lb is available to 86°F ambient temperature sea level static. Engines equipped with water injection systems may be operated at wet takeoff rating without activating the water injection system when ambient temperatures are 32°F and below.
-7H	Same as -7 except for fan hub which is -3A engine fan hub. Ratings are same as those for -7.
-7A	Same as -7 except dry takeoff rating of 46,150 lb is available to 80°F ambient temperature sea level static, and wet takeoff rating of 47,670 lb is available to 86°F ambient temperature sea level static. Engines equipped with water injection systems may be operated at wet takeoff rating without activating the water injection system when ambient temperatures are 32°F and below.
-7AH	Same as -7A except for fan hub which is -3A engine fan hub. Ratings are same as those for -7A.
-7F	Same as -7A except for dry takeoff rating of 46,750 lb (48,000 lb ideal) is available to 80°F ambient temperature sea level static, and wet takeoff rating 48,650 lb (50,000 lb ideal) is available to 86°F ambient temperature sea level static. Engines equipped with water injection systems may be operated at wet takeoff rating without activating the water injection system when ambient temperature are 32°F and below.
-7J	Same as -7F except no wet rating. Dry takeoff thrust is available to 86°F ambient temperature sea level static. The thrust is 48,560 lb (50,000 lb ideal) and Max. EGT is 985°C Tt6, due to an improved high pressure turbine (See NOTE 5.)
-20	Same as -7 except for gearbox and certain accessories are mounted external to the fan case and the thrust attachment points are located on the intermediate case. Dry takeoff rating of 44,500 lb is available to 84°F ambient temperature sea level static, and wet takeoff rating of 47,500 lb is available to 86°F ambient temperature sea level static. Engines equipped with water injection system may be operated at wet takeoff rating without activating the water injection system when ambient temperatures are at standard +6°F and below. These ratings represent McDonnell Douglas DC-10 aircraft installed performance.
-20B	This engine model has never been produced and no future manufacturing is contemplated, thus it is deleted.
-20J	Same as -20 except no wet rating. Dry takeoff thrust is available to 86°F ambient temperature sea level static. The thrust is 48,050 lb (5,000 lb ideal) and Max. EGT is 985°F Tt6 due to an improved burner and improved high and low pressure turbine.
The JT9D-7F, JT9D-7J, Sea Level Static Ratings are ideal and are based on ICAO Standard Atmosphere conditions, the specified fuel and oil, a Pratt & Whitney hardwall bellmouth inlet, no fan or compressor airbleed or load on accessory drives, an exhaust system having no internal pressure or external scrubbing losses and fan duct and primary nozzle velocity coefficients equal to 1.0.	

NOTE 16. The smoke requirements of SFAR 27.2 have been met by these engine models: JT9D-7A, -7F, and -7J.

NOTE 17. For standard equipment, refer to Pratt & Whitney specification numbers listed below:

<u>MODEL</u>	<u>PW SPEC. NUMBER</u>
JT9D-3A	6157
JT9D-7	1994
JT9D-7H	6212
JT9D-7A	6165
JT9D-7AH	6222
JT9D-7F	6211
JT9D-7J	6239
JT9D-20	6190
JT9D-20J	6426

NOTE 18. Use of takeoff thrust for more than five minutes (not to exceed ten minutes) is approved for use only in the event of an inoperative engine due to shut down.

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